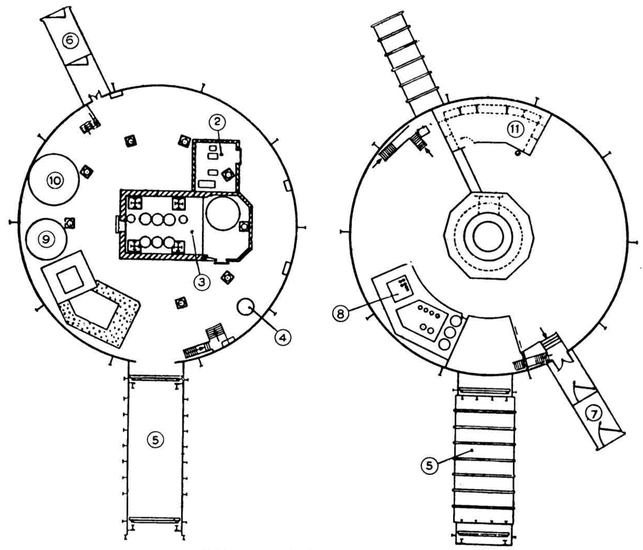
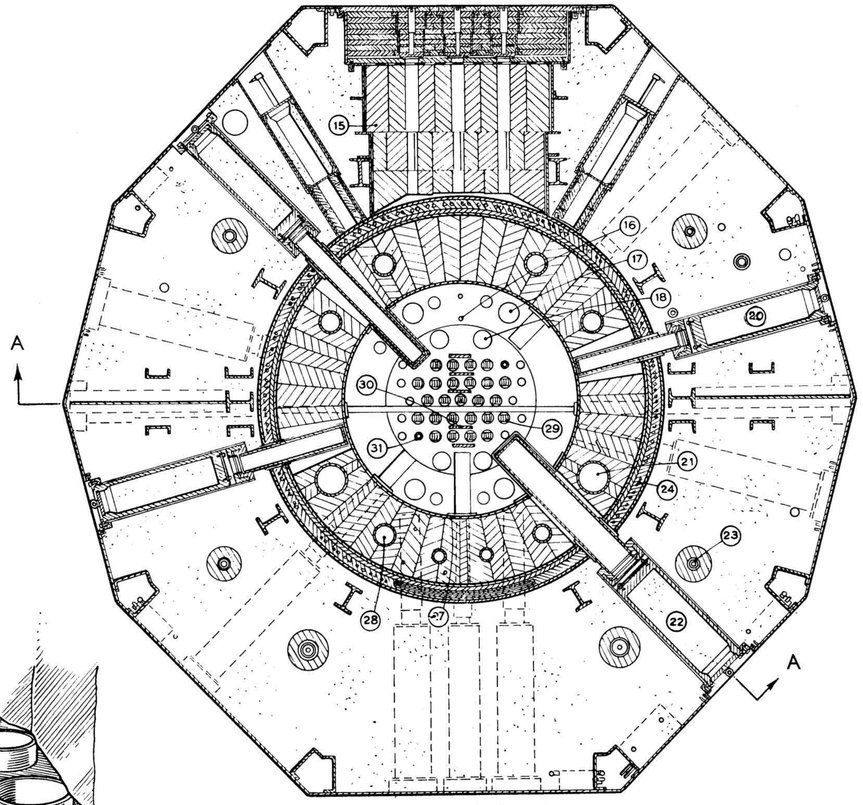
The World's Reactors

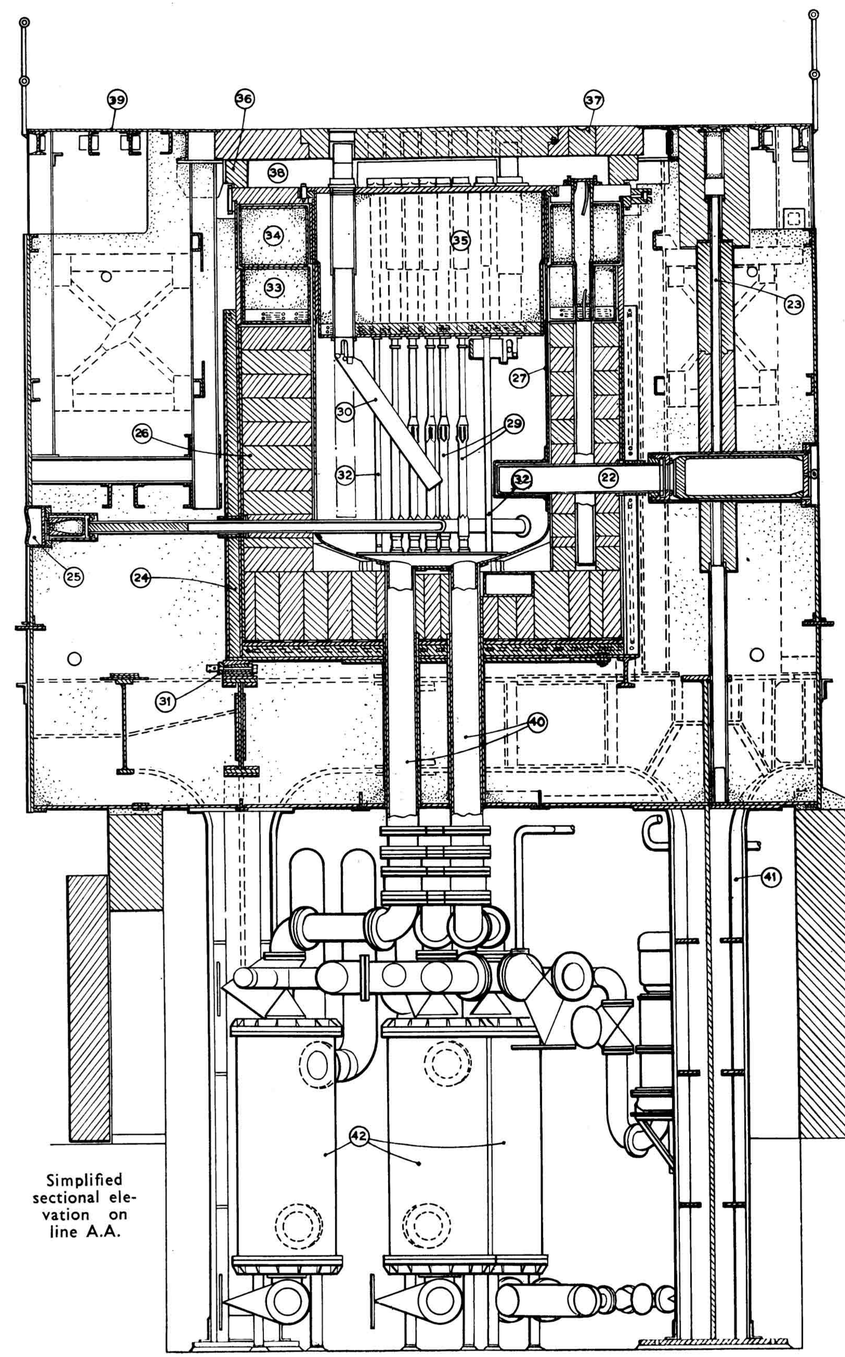
No. 8 — DIDO



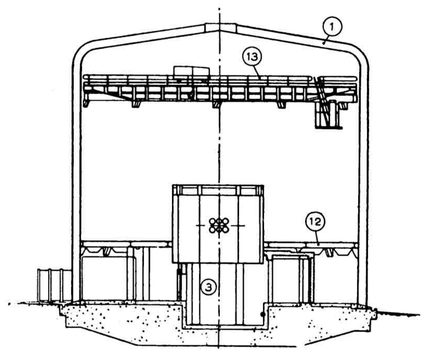
Block plans of reactor building: on left, at ground level; on right, at operating floor level.



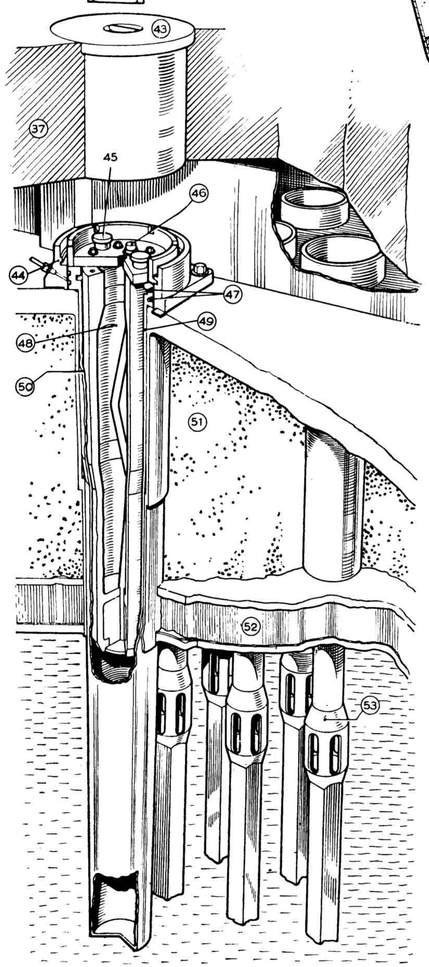
Simplified sectional plan of reactor.



Simplified sectional elevation on line A.A.



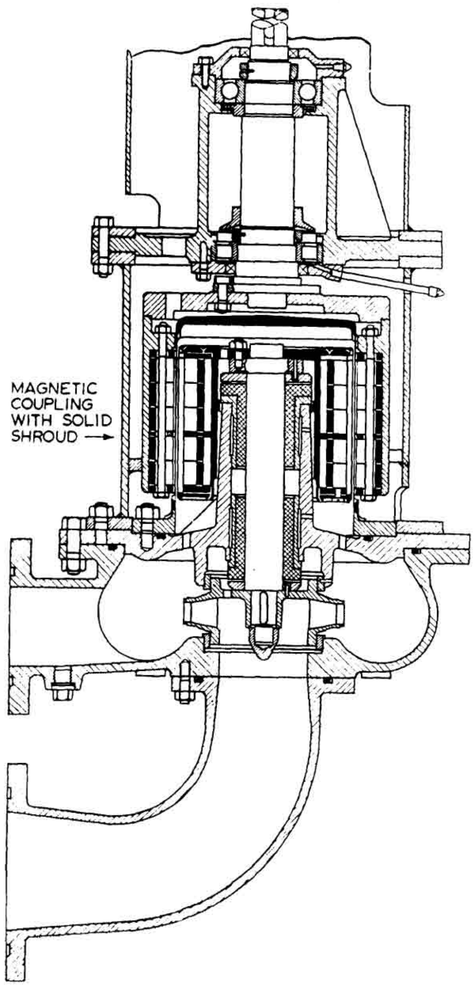
Simplified sectional elevation of building.



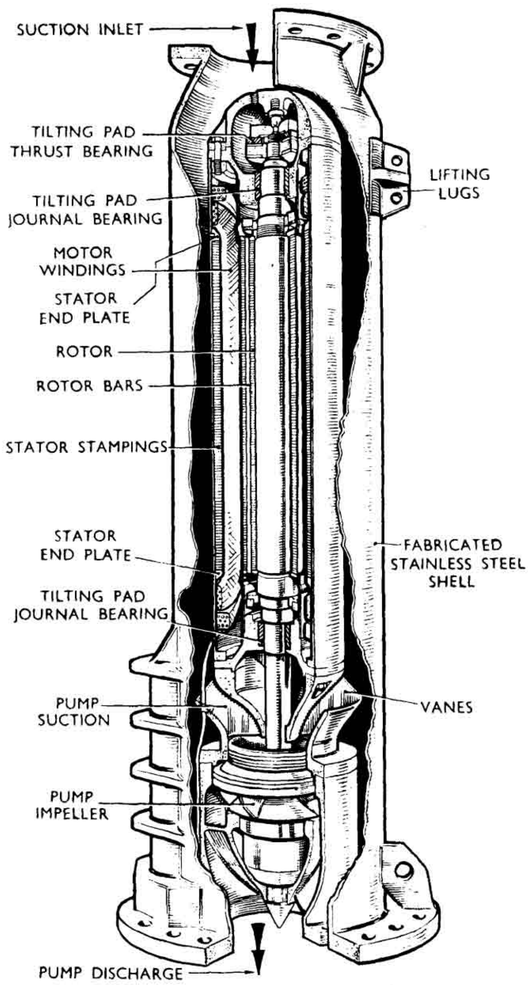
Arrangement of vertical experimental facility. *Note — The fuel elements must be regarded as diagrammatic only; the exit port arrangements have been modified.*

KEY

1. Steel building
2. Shield cooling water pumps
3. Heavy-water plant room
4. Helium gasholder (100 cu. ft.)
5. Vehicle air lock
6. Emergency exit
7. Personnel air lock
8. Fuel-element storage block
9. Helium gasholder (500 cu. ft.)
10. Expansion vessel
11. Control room
12. Working floor
13. Rotary crane
14. Steel diaphragm
15. Thermal column
16. 1-in. heavy-water overflow pipe
17. 7-in. heavy-water outlet pipe
18. 6-in. vertical facility in heavy water
20. 6-in. horizontal facility in graphite
21. 10-in. vertical facility
22. 10-in. horizontal facility in heavy water
23. 2-in. mortuary hole
24. Double steel tank with water-cooled lead shield and boral lining
25. 4-in. × 2-in. oval horizontal facility going right through the reactor
26. Graphite reflector
27. Aluminium tank
28. 6-in. vertical facility in graphite
29. Fuel elements
30. Coarse control "signal arms"
31. Wedge for tank levelling
32. 2-in. vertical facility
33. Lower annular shield
34. Upper annular shield
35. Top shield
36. Cast-iron ring
37. Reactor top plate
38. Void for pipes and cables
39. Floor plating
40. Heavy-water inlet
41. Main cruciform stanchions
42. Heavy-water heat exchangers
43. Removable plug
44. Adaptor
45. Locking control
46. Purge connector
47. Sealing rings
48. Concrete filling for plug
49. Aluminium liner tube
50. Stainless-steel liner tube
51. Concrete biological shield
52. Lead shield
53. Fuel elements (Note: design has been changed)



(Left) Section of H.M.D. stand-by heavy-water pump, showing magnetic coupling with solid shroud.



(Above) Sectional view of Hayward-Tyler main heavy-water pump, showing drowned motor construction.

DIDO: EXPERIMENTAL FACILITIES

General Description	Dimensions	Number
Fixed horizontal round tubes:		
(a) entering D_2O reflector	10 in. diam.	1
	6 in.	1
	4 in.	6
(b) entering graphite reflector only	6 in.	10
Fixed, horizontal oval tube passing right through D_2O reflector	4 in. × 2 in.	1
Removable, vertical round tubes:		
(a) entering D_2O reflector	6 in.	4
	4 in.	5
	2 in.	9
(b) entering graphite reflector only ...	6 in.	6
	4 in.	2
	10 in.	2
Fixed horizontal rectangular tube passing right through bottom graphite reflector	8 in. × 12 in.	2
Thermal column of graphite containing square holes	5 ft. × 5 ft.	1
	4 in. × 4 in.	9

The World's Reactors—No. 8

DIDO — D(i)DO

TYPE: Thermal heterogeneous.

PURPOSE: High flux testing.
Production of radio-isotopes.

LOCATION: A.E.R.E., Harwell, England.

OPERATION: Official opening, November 21, 1956.

FUEL: Enriched uranium alloy, box type.
Alloy: uranium-aluminium, aluminium clad.
Plate form: 23.6 in. × 2.36 in. × 0.036 in.
Curvature: on radius, $5\frac{1}{2}$ in.
Assembly: 2.9 in. sq. approx., nine plates per box.
Total investment: $2\frac{1}{2}$ kg.

CLADDING: Aluminium: SIC.
Treatment: Aluminium sheet, welded on three sides, rolled.

MODERATOR: Heavy water.
Total investment: 10 tons.

CORE: Reacting core: 34 in. × 28 in. × 24 in. high.
Core tank: 99.8% purity Al., 6 ft. 7 in. diameter.
Lattice: basically square, central row displaced, 6-in. pitch.
Number of fuel elements: 25.

REFLECTOR: Graphite.
Segmental blocks, lead bound.
Radial thickness: 24 in.

COOLANT: Heavy water.
Flow rate through elements: 11.7 ft./sec.

FLUX: Maximum thermal neutron flux: 10^{14} n/cm^2-sec.

CONTROL: Coarse control/shut-off: six in number.
Construction: 0.080-in.-thick cadmium sheet, welded between 20 S.W.G. stainless-steel sheet.
Signal arm: 4 ft. 10 in. long.
Fine control rod: one in number.
Construction: 24 in. long, 255 cm.^{2}, cylinder contained between two stainless-steel tubes.
Safety rods: two in number.
Construction: Stainless-steel tube containing 990-cm.^{2} cadmium cylinder, 30 in. long.

SHIELDING: Top: Inner: 2 mm, 4 in. water-cooled lead.
Intermediate: concrete.
Outer: cast iron and steel.
Side and bottom:
Inner: boral plates.
Intermediate: steel tank 10 ft. $10\frac{1}{2}$ in. I.D. × 13 ft. 2 in. high, skin thickness $\frac{5}{8}$ in., $1\frac{1}{2}$-in. bottom plate, 4 in. water-cooled lead between skins.
Outer: Barytes concrete, 5 ft. thick.

OVERALL SIZE: Ten-sided prism 22 ft. across flats; height 17 ft. from operating floor, 32 ft. from lower floor.

OUTER SHELL: Steel building, 70 ft. diameter, pressurized at $\frac{1}{8}$ in. W.G. below atmosphere.

A limited supply of separate copies is available of this series of data sheets on various reactors built or projected throughout the world. Copies may be obtained from the publishers, Temple Press Limited, Bowling Green Lane, London, E.C.1, at the cost of packing and postage only (4d. each).